



E-ISSN: 2709-9385
P-ISSN: 2709-9377
JCRFS 2021; 2(1): 19-26
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www.foodresearchjournal.com
Received: 12-11-2020
Accepted: 18-12-2020

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Nutritional status and academic performance of school aged children (6-12 years) in ikwuano local government area Abia state, Nigeria

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Abstract

Introduction: Nutrition is a fundamental pillar to human life, health and development. Malnutrition in children results in poor health, illness and poor academic performance.

Objective: The study assessed the nutritional status and academic performance of school aged children (6-12years) in Ikwuano Local Government Area of Abia State.

Methods: Three hundred and twenty respondents were selected using simple random sampling technique. A structured questionnaire was used to gather information on socio economic characteristics, dietary practices and academic performance of the children. Anthropometric indices (weight for age, height for age, and BMI for age) and dietary intakes of the infants were also assessed. World Health Organization (WHO), child growth standard chart was used to classify the anthropometric indices.

Results: Most of the respondents were between the ages of 9- 10 years (47.8 %) and 11-12 years (25.9 %). The pupils were mostly in primary 4 (40.9 %) and primary 5 (25.9 %). Most of the parents involved in the study were less educated as only a few (respondents' fathers 18.7 % and respondents' mothers 15.6 %) had reviewed formal education in tertiary institutions. The academic performance showed that 31.9% of the respondents had good scores, 26.2% had average academic performance, and 19.5% had low academic performance while only 15.6% were graded excellent. Females had better (above average) academic performance than males (54.7% and 48.2% respectively). The study reveals 28.1% of the respondents were stunted, 12.8% were wasted, 13.8% were underweight for Weight- for- height, 15.6% were underweight for BMI- for- age and 12.5% were underweight for MUAC- for- age. Females were more stunted than males. The percentage of overweight was higher in females than in males. A significant relationship exist between the children's BMI for age and academic performance grade ($\chi^2=19.47$; $P=0.03$) and MUAC for age ($\chi^2=17.12$; $P=0.04$).

Conclusion: Excellent academic performance can be achieved if emphasis is laid on improving the nutritional status of children.

Keywords: Academic performance, nutritional status, school aged children, assessment, Ikwuano L.G.A, Abia State, Nigeria

Introduction

Nutrition is a fundamental pillar to human life, health and development (Nicolson *et al.*, 2006). Good nutrition refers to the intake of adequate diet which supplies the essential nutrient to meet the entire body's requirements (Joshi, 2002) [19]. Malnutrition is a state of nutrition in which there is deficiency of one or more nutrients (Doswet *et al.*, 2005) [10] malnutrition constitutes a major health problem, not only in developing countries but in many developed parts of the world (Nnakwe, 2009) [24]. Malnutrition in school aged children results in poor health, illness and poor academic performance (Alaimo *et al.*, 2001) [1]. School aged children are vulnerable to malnutrition, which may alter brain development and interfering with overall health, as well as with the child's energy level and rate of motor development and growth (Ivanovic *et al.*, 2002).

Children are the wealth of the nation, as they constitute one of the important segments of the population (Upadahayaya *et al.*, 2001) [30]. A foundation of good health and sound mind is laid during the school aged period. School age is considered as dynamic period of growth and development, because children undergo physical, mental, emotional, and social changes. The nutritional status of school aged children impact their health, cognitive ability and subsequently their educational achievement (Best *et al.*, 2010) [3]. Poor nutrition leaves students susceptible to illness or lead to headaches and stomach aches, resulting in school absence (Brown *et al.*, 2008) [7].

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Nutritional assessment consist of the gathering of data to identify individuals who requires special care, determine the cause and degree of malnutrition, and determine the potential risk for developing malnutrition or related complications (Gibson, 2002) ^[14]. Nutritional status is a condition of the body, as it relates to the consumption and utilization of food. Anthropometry is considered the most useful tool use to assess the nutritional status of children. WHO experts committee on nutritional surveillance recommended the use of height for age as the primary indicator of nutritional status of children (WHO, 2000) ^[32]. Children have faster physical growth and cognitive development during their early life. By the age of four, fifty percent of the adult intellectual capacity has been attained, and before thirteen years, ninety-two percent of the adult intellectual capacity is attained (Braveman and Gruskin, 2003) ^[5]. In contrast, nutritional deficiencies early in life can affect the cognitive development of children (Sorhaindo and Freinsein, 2006) ^[29]. Access to nutrition that incorporates protein, carbohydrates, and glucose has been shown to improve students' cognition, concentration, and energy levels (Sorhaindo and Feinstein, 2006) ^[29]. Research has established link between nutrition and behavior. Studies have found that access to nutrition, particularly breakfast can enhance a student's psychological well-being, reduce aggression and school suspension, and decrease discipline problems (Brown *et al*, 2008) ^[7]. This study focuses on assessing the nutritional status and academic performance of school age children (6-12 years).

Specific Objectives

- i. Examine the academic performance of the children using their cumulative class average and scores.
- ii. Assess the nutritional status of children using anthropometric measurement.
- iii. Assess the relationship between academic performance and nutritional status of the children

Materials and Method

Study Design

This study is a cross-sectional study designed to assess the nutritional status and academic performance of school aged children aged in Ikwuano Local Government area Abia State.

Area of Study

Ikwuano Local Government area is in Abia State. The Northern border of Ikwuano is three miles (4.8km) South of Umuahia urban center. Ikwuano local government has fifty-seven villages and seventeen communities. The major occupation of Ikwuano people is agriculture. Ikwuano is blessed with abundant fertile land that yield many agricultural products, such as cassava, yams, palm oil and kernel, cocoa, kolanuts, palm wine, vegetables and fruits (Osundu, 2012). Their sources of water supply are stream, well, and boreholes.

Population of Study The study consists of school-aged children (6-12 years) in Ikwuano local Government Area.

Sample Size

The sample size was calculated using the formula:

$$N = \frac{Z^2 \times P (100 - P)}{X^2}$$

He sample size calculated was 316.4. The sample size was rounded up to 320 to make room for dropouts and incorrectly filled questionnaires.

Sampling Procedure

Random sampling was used in selecting four schools from the local Government. This was done by writing the names of all the schools in Ikwuano Local Government on separate sheets of paper, folding each of them, mixing them together and then picking any two of the papers from the lot. The sample size of three hundred and twenty (320) was equally divided among the four schools to obtain a total of eighty (80) respondents per school. Simple random sampling was used to select the pupils from each of the classes. This was done by the use of their school register.

Preliminary Activity

Preliminary Visit and Consent

Before the commencement of data collection, preliminary visit was made to the schools for introduction to the authorities, to familiarize with the environment as well seek permission from the school authority to carry out the survey. A letter was presented to the head teacher of the school to seek their consent as well as the consent of the parents for the survey. The day of commencement of field work was agreed upon.

Questionnaire Administration

Data collection was done using validated questionnaires. Information on background characteristics such as sex, name, class residence, and position in family, socio-economic characteristics of parents such as parents' occupation, income of parents, number of children, parents' educational level, and number in households were collected. Information on dietary habits, 24hours dietary recall and academic performance of children was also obtained.

Anthropometric Measurements

Anthropometric measurement of height, weight and arm circumference was taken.

1. Height Measurement

The standing body height was measured to the nearest 0.1cm, using a calibrated stick fixed to the wall. The subjects stood (without shoes) on a horizontal platform with their heels held together. The subjects were asked to stand erect with their feet closed together, flat on the ground and their shoulders straight (Lanthan, 2004) ^[20].

2. Weight Measurement

Body weight was measured with a portable bathroom scale (Hansen Ireland Model). The weighing scale was placed on a flat surface, set to zero and each subject was asked to stand with minimum clothing so as to get accurate result. Each reading was made to the nearest 0.1 kg (Gordon, 2002) ^[14].

3. Arm Circumference

This was measured to the nearest length of the centimeter on the left arm of each subject. The measurement was done by determining the midpoint of the subjects' non-dominant arm, with the arm in a relaxed position. The tape measure was placed between the shoulder (Acromial Process), and the midpoint of the arm was marked. They were asked to let

the arm hang loosely at the side. The tape was placed around the subjects’ arm at the midpoint, and the circumference was recorded in centimeters (Willams and Shenkers, 2003) [34].

Dietary Measurement

Twenty four hours (24hrs) dietary recall was used to assess their dietary intake. Twenty four hours dietary recall is a quantitative research method used in nutritional assessment, which ask individuals to recall food and beverage they consumed in the 24 hours prior to the interview (Bernard, 2006). In this study, the pupils were asked to recall what they ate in the last 24hours.

Assessment of Academic Performance

This study implored the use of school examination reports. At each school the average score in percentage for each child in each of the three (3) terms examinations for the academic year was documented. The average of the three results was calculated as the overall score of the child. This represented the academic performance, and was further graded as: Excellent (70-100%), Good (60-69%), Average (50-59%), and low (less than 50%), (Ogunfowora *et al.*, 2005) [26]. This class cumulative-, was obtained from their class teacher’s records.

Statistical Analysis

Descriptive statistics (mean, frequency and percentage) were computed for the categorized and continuous variable. The Nutritional status of the respondents was assessed using the 2006 World Health Organization (WHO) growth standards with the WHO Anthro. 2005 program Version 2.0. Cross tabulations and Chi square tests were used to determine the relationship between nutritional status parameters, socio-economic and food habit variables. All statistical analysis was done using statistical package for social sciences (SPSS) version 20.

Results

Result in table 1 shows there were more females (57.8%) than male (42.2%) pupils. Most of the respondents were between the ages 9-10years (47.8%) and 11-12years (25.9%) years old. Only a few were 6-8years (19.4%). The pupils were in primary 2(14.1%), primary 3 (19.1%), primary 4 (40.9%) and primary 5 (25.9%). More than half of the respondents (55.6%) had a family size

of 6-8 members, 36.8% had a family size of 3-5 members.

Table 1: Children’s individual characteristics

Parameters	Frequency	Percentage
Sex		
Male	135	42.2
Female	185	57.8
Total	320	100
Age (years)		
6-8	62	19.4
9-10	153	47.8
11-12	83	25.9
>12	22	6.9
Total	320	100
Class		
Primary 2	45	14.1
Primary 3	61	19.1
Primary 4	131	40.9
Primary 5	83	25.9
Total	320	100
Size of the family		
3-5	118	36.8
6-8	178	55.6
Above 8	24	7.5
Total	320	100
Child’s Position		
First child	96	30.0
Second child	92	28.8
Third child	59	18.4
Fourth child	53	16.6
Fifth child	20	6.3
Total	320	100

Result from table 2 reveals the socio-economic status of the parents. Trading (30.0%) and farming (28.8%) was found to be the major occupation of most respondents’ mother, while many of the respondents’ fathers were either farmers (45.0%) or civil servants (23.8%). Majority of the respondents parents were not educated as 16.6% mothers and 24.7% fathers had no formal education, 21.6% fathers and 35% mothers had primary education. Only a few fathers (18.7%) and mothers (15.6%) had received formal education in tertiary institutions. Most of the households (59.7%) earned incomes below ₦50,000 per month. About 20.3% and 15.6% of households earned ₦50,000- ₦80,000 and ₦80,000 – ₦110,000 per month respectively. Only 4.4% of households earned above ₦110,000 per month.

Table 2: Socio-economic status of parents

Parameters	Frequency	Percentage
Mothers occupation		
Trader	96	30.0
Farmer	92	28.8
Teacher	59	18.4
Civil servant	53	16.6
Unemployed	20	6.3
Total	320	100
Fathers occupation		
Trader	50	15.6
Farmers	144	45.0
Civil servants	76	23.8
Artisan	22	6.9
Unemployed	22	6.9
Others	6	1.9
Total	320	100

Fathers education		
No formal education	53	16.6
Primary	69	21.6
Secondary	138	43.1
Tertiary	60	18.7
Total	320	100
Mothers education		
No formal education	79	24.7
Primary	112	35.0
Secondary	79	24.7
Tertiary	50	15.6
Total	320	100
Family income level		
₦<20,000	79	24.7
₦20,000- ₦50,000	112	35.0
₦51,000-₦80,000	65	20.3
₦81,000-₦ 110,000	50	15.6
Above ₦110,000	14	4.4
Total	320	100

Information on the academic performance of the pupils is summarized in table 3. Results show that 39.1% of the respondents had good academic performance, 26.2% had average academic performance, and 19.5% had low academic performance. Only 15.6% had excellent academic performance. Results further revealed that the girls had better academic performance (87.1%) than the male pupils (72.6%). Males (27.4%) had low academic performance than females (13%).

Table 3a: Academic performance of children

Parameters	Frequency	Percentage
Academic performance		
Low (>50)	61	19.1
Average (50-60)	84	26.2
Good (60-70)	125	39.1
Excellent (70-100)	50	15.6
Total	320	100

Table 3b: Academic performance of male and female children

Parameters	Male		Female	
	Frequency	Percent	Frequency	Percent
Low (>50)	37	27.4	24	13.0
Average (50-60)	33	24.4	51	27.6
Good (60-70)	49	36.3	76	41.1
Excellent (70-100)	16	11.9	34	18.4
Total	135	100	185	100

Table 4 and 5 shows the relationship between socio-economic variables, dietary pattern and academic performance of pupils. Parents with low education had the highest number of children with low academic performance. However, there was no significant relationship ($P>0.05$) between parents' education and academic performance of

their children. There was also no significant relationship ($P >0.05$) between family income and academic performance of children. A significant relationship ($P<0.05$) exist between the pupils frequency of daily consumption and academic performance ($P = 0.04$) and also between meals skipped and academic performance ($P = 0.03$).

Table 4: Cross tabulation and chi-square of some socio- economic variables and academic performance of Children

Parameters	Low		Average		Good		Excellent		Total		P-value
	No	%	No	%	No	%	No	%	No	%	
Father's education											
No formal	10	16.4	32	38.1	7	5.6	4	8	53	16.5	0.48
Primary	7	27.9	6	19.0	30	24	6	12	69	21.6	
Secondary	32	52.5	14	16.7	68	54.4	24	48	138	43.1	
Tertiary	2	3.2	22	26.2	20	16	16	32	60	18.8	
Total	61	100	84	100	125	100	50	100	320	100	
Mother's education											
No formal	25	40.9	21	25	25	20	8	16	79	24.7	0.27
Primary	16	26.2	30	35.7	39	31.2	27	54	112	35.0	
Secondary	8	13.2	23	27.4	45	36	3	6	79	24.7	
Tertiary	2	19.7	10	11.9	16	12.8	12	24	50	15.6	
Total	61	100	84	100	125	100	50	100	320	100	
Family income											
<₦20,000	22	36.0	10	11.9	39	31.2	7	14	78	24.7	0.07
₦20,000-50,000	24	39.4	8	57.1	29	23.2	11	22	112	35.0	
₦51,000-80,000	8	13.1	20	23.8	23	18.4	15	30	66	20.3	
₦81,000-110,000	7	11.5	3	3.6	30	24	10	20	50	15.6	
>₦110,000	-	3	3	3.6	4	3.2	7	14	14	4.4	
Total	61	100	84	100	125	100	50	100	320	100	

Table 5: Cross tabulation chi-square of dietary pattern and academic performance of Children

Parameter	Low		Average		Good		Excellent		Total		P-value
	No	%	No	%	No	%	No	%	No	%	
Freq. of daily consumption											0.04
Once	7	11.5	5	5.9	-	-	-	-	2	3.7	
Twice	8	13.1	11	13.0	28	22.4	6	12	53	16.6	
Thrice	44	72.1	65	77.3	89	71.2	39	78	237	74.1	
Others	2	3.3	3	3.8	8	6.4	5	10	18	5.6	
Total	61	100	84	100	125	100	50	100	320	100	
Meals skipped											0.03
Breakfast	11	18.0	11	13.1	4	3.2	2	4	28	8.8	
Lunch	26	42.6	44	52.4	29	23.2	3	6	102	31.9	
Dinner	5	8.2	10	11.9	4	3.2	4	8	23	7.2	
No response	19	31.2	19	22.6	88	70.4	41	82	167	52.2	
Total	61	100	84	100	125	100	50	100	320	100	

Nutritional Status of the Children

Results from table 6 present the nutritional status of the Children. About 28.1% of the respondents were stunted, 12.8% were wasted, 13.8% were underweight for Weight-for-height, 15.6% were underweight for BMI-for-age and 12.5% were underweight for MUAC-for-age. About 20.9% of the respondents were overweight for weight-for-age, 23.1% overweight for weight-for-height, and 21.6% overweight for BMI-for-age and 22.8% overweight for MUAC-for-age.

Results from table 7 present the nutritional status of the

Children by sex. Females (28.7%) were more stunted than males (27.4%). Weight-for-age values of the respondents showed that the males (15.6%) were more wasted than the females (10.8%). Also the result show high percentage of underweight males (14.8%) than females (13.0%).The percentage of overweight was higher in female than in male respondents. For weight-for-age; males 20.7%, females 21.1%. Weight-for-height; males 20.8%, females 24.9%. BMI-for-age; males 8.9%, females 30.8%. MUAC-for-age; males 7.4%, females 34.6%.

Table 6: Nutritional status of the Children Studied

Parameters	Frequency	Percentage
Height- for- age		
Stunting	90	28.1
Normal	230	71.9
Total	320	100
Weight- for- age		
Wasted	41	12.8
Normal	212	66.3
Overweight	67	20.9
Total	320	100
Weight- for- height		
Underweight	44	13.8
Normal	202	63.1
Overweight	74	23.1
Total	320	100
BMI- for- age		
Underweight	50	15.6
Normal	201	62.8
Overweight	69	21.6
Total	320	100
MUAC- for- age		
Underweight	40	12.5
Normal	207	64.7
Overweight	73	22.8
Total	320	100

Table 7: Nutritional status of Children by sex

Parameters	Male		Female	
	Frequency	Percentage	Frequency	Percentage
Height- for-age				
Stunting	37	27.4	53	28.7
Normal	98	72.6	132	71.3
Total	135	100	185	100
Weight- for- age				
Wasted	21	15.6	20	10.8
Normal	86	63.7	126	68.1
Overweight	28	20.7	39	21.1

Total	135	100	185	100
Weight-for-height				
Underweight	20	14.8	24	13.0
Normal	87	64.4	115	62.1
Overweight	28	20.8	46	24.9
Total	135	100	185	100
BMI- for- age				
Underweight	31	23.0	19	10.3
Normal	92	68.1	109	58.9
Overweight	12	8.9	57	30.8
Total	135	100	185	100
MUAC- for- age				
Underweight	32	23.7	8	4.3
Normal	93	68.9	113	61.1
Overweight	10	7.4	64	34.6
Total	135	100	185	100

Relationship between Nutritional Status and Academic Performance of Respondents

Results from table 8 show the relationship between the subjects’ academic performance and their nutritional status

parameters. A significant relationship ($P < 0.05$) exist between the pupils BMI- for- age and academic performance ($P = 0.03$), as well as their MUAC- for- age and academic performance ($P = 0.04$).

Table 8: Cross tabulation and chi-square test between pupils’ nutritional status and their academic performance

Parameters	Low		Average		Good		Excellent		P-value
	No	%	No	%	No	%	No	%	
Height-for- age									0.823
Stunting	18	20	14	15.6	47	52.2	11	12.2	
Normal	43	18.7	70	30.4	78	39.9	39	17	
Total	61	100	84	100	125	100	50	100	
Weight- for- age									0.61
Underweight	10	24.4	13	31.7	15	36.6	3	7.3	
Normal	40	18.9	58	27.4	89	41.9	25	11.8	
Above normal	11	67.5	13	19.4	21	31.3	22	32.8	
Total	61	100	84	100	125	100	50	100	
Weight-for- height									0.53
Underweight	16	36.4	18	40.9	7	15.9	3	6.8	
Normal	35	17.3	54	26.7	90	44.6	23	11.4	
Above normal	10	17.3	12	16.2	28	37.8	24	32.5	
Total	61	100	84	100	125	100	50	100	
BMI- for- age									0.03
Underweight	17	34	1	34	11	22	5	10	
Normal	39	19.4	62	30.8	87	33.3	13	6.5	
Above normal	5	7.2	5	7.2	27	39.9	32	46.4	
Total	61	100	84	100	125	100	50	100	
MUAC- for- age									0.04
Underweight	18	45	7	17.5	11	27.5	4	10	
Normal	39	18.9	70	33.8	86	41.5	12	5.8	
Above normal	4	5.5	7	9.5	28	38.4	34	46.5	
Total	61	100	84	100	125	100	50	100	

Discussion

The study had more females (57.8%) than male (42.2%) this shows that more females are attending schools compared to previous reports (NDHS, 2008) [22]. Improving girls’ educational levels has been demonstrated to have clear impacts on the health and economic future of young women, which in turn improves the prospects of their entire community (Riane, 2007) [28]. Most of the parents involved in the study were not well educated as only 18.7% fathers and 15.6% mothers had received formal education in tertiary institutions. This, therefore was reflected in their poor family income status as most (59.7%) of the households earned below ₦50,000 per month. Trading and farming were found to be the major occupation of most respondents’ parents. This is so because Ikwuano is blessed with abundant fertile land that yields many agricultural products.

More than half of the respondents (55.6%) had a family size of 6-8 members. The number of people in the house hold affects the quality and quantity of food consumed and the more the number of people the less the amount of resources available to the individuals (Ene-Obong, 2001) [13]. The academic performance of the respondents was fair as 39.1% of the respondents had good academic performance, 26.2% had average academic performance, and 15.6% had excellent academic performance. Only 19.5% had low academic performance. Girls had better academic performance (87.1%) than their male counterparts (72.6%). Result from this study is in line with that carried out by Ejekwu *et al.* (2012) [12] in Enugu State, Nigeria. The relationship between gender and the academic achievement have been discussed for decades (Elite, 2006) [11]. A gap between the achievement of boys and girls has been found,

with girls showing better performance than boys in certain instances (Chamber and Schreiber, 2004) ^[9]. Girls usually show more efforts leading towards better grades at school (Ceballo *et al.*, 2004) ^[8]. A significant relationship ($P < 0.05$) exist between the pupils frequency of daily consumption and academic performance. There is evidence that frequent food consumption particularly breakfast positively affects learning in children in terms of behavior, cognitive, and school performance (Hoyland *et al.*, 2012) ^[16]. Meals skipped and academic performance also had a significant association ($P = 0.03$). Researchers have shown that time constraints is the most common cause of meal skipping among school aged children (Boschloo *et al.*, 2012) ^[4]. As schedules become cluttered with classes, recreation and other activities, health is the first to go because it's the easiest to sacrifice. According to the UN World Food Program, in developing countries almost 60 million children go to school hungry every day, about 40% of them are in Africa. Parents with low education had the highest number of children with low academic performance. Ejekwu *et al.* (2012) ^[12] found that mothers who were educated had their children performing better than children of non-educated mothers. This was so because educated mothers were able to take better care of their children. The study reveals 28.1% of the respondents were stunted, 12.8% were wasted, 13.8% were underweight for Weight- for- height, 15.6% were underweight for BMI- for- age and 12.5% were underweight for MUAC- for- age. The percentage of overweight was higher in female than in male respondents. This could be as a result of gender differences of females reaching puberty faster than males and there by accumulating adipose tissues. The finding confirms UNICEF publication that the prevalence of malnutrition was high in children (UNICEF, 2007) ^[31]. A study in Enugu State reported the prevalence of stunting, wasting and underweight in children as 27.7%, 25.5% and 29.9% respectively (Ejekwu *et al.*, 2012) ^[12]. The Nigeria Demographic and Health Survey, 2008 reported the prevalence of stunting as 41%, wasting 14% and underweight 23%. Stunting and underweight in this study is slightly less than indicated by NDHS (2008) ^[22]. It should be noted that this study was localized and so care must be taken in comparing it with a national data. Females (28.7%) were more stunted than males (27.4%). This is in line with the study of Oguizu and Nnadede. (2016) ^[25]. Cultural practices in Nigeria where male children are preferred and served better meal portions than females may have contributed to the high prevalence of malnutrition among females (Oguizu and Nnadede, 2016) ^[25]. The males were more wasted and underweight than the females. The higher percentage of wasting and underweight in male children may be attributed to their higher vulnerability to short-term seasonal food shortages. A significant relationship exist between the pupils BMI- for- age ($P = 0.03$) and academic performance and MUAC- for- age and academic performance ($P = 0.04$).

Conclusion

The academic performance of the respondents was fair. The nutritional status of the school children in this study is poor. The children had an excess prevalence of stunting, wasting and underweight. The prevalence of stunting was 28.1% wasting 12.8% and underweight 13.8%. Females (28.7%) were more stunted than males (27.4%). cultural practices in Nigeria where male children are preferred and served better

meal portions than females may have contributed to the high prevalence of stunting among females. The males were more wasted and underweight than the females. The higher percentage of wasting and underweight in male children may be attributed to their higher vulnerability to short-term seasonal food shortages. Females were more overweight than male respondents. Based on our findings, it appears that obesity is still uncommon. Overweight is appearing in school children especially amongst females. There is need for an improved nutritional status of school aged children for a better academic performance.

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